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Phyllactinia and *Ovulariopsis* species on legumes

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Abstract — Four new powdery mildew species belonging to tribe *Phyllactinieae* are described, illustrated, and discussed. These include *Phyllactinia erythrinae-americanae* based on Mexican material on *Erythrina americana*, *P. robiniae* occurring in North America on *Robinia neomexicana* and *R. pseudoacacia*, *Ovulariopsis erythrinae-abyssinicae* on *Erythrina abyssinica* in Zambia, and *O. leucaenae* on *Leucaena latisiliqua* in Honduras and Mexico. The South African *Phyllactinia erythrinae* is redescribed based on an examination of type material. Host ranges, distributions and the affinities of these new taxa to other species of *Phyllactinia* and *Ovulariopsis* on legumes, including *Phyllactinia fraxini* on *Wisteria sinensis* in Europe, are discussed, and a key to the species concerned is provided.

Key words — *Erysiphales*, *Fabaceae*, taxonomy

Introduction

Previously, *Phyllactinia guttata* (Wallr. : Fr.) Lév. was considered a plurivorous species complex on a wide range of hosts (Braun 1987). However, based on molecular sequence analyses (Takamatsu et al. 2008) and morphological differences in the shape and size of penicillate cells (Shin & Lee 2002), it was shown that a narrower species concept has to be applied within *Phyllactinia* Lév., i.e. the compound species *P. guttata* s. lat. has to be split into several species. Samples of *Phyllactinia* on *Erythrina americana* recently collected in Mexico led to a comparison with type material of *Phyllactinia erythrinae*, a taxon described from South Africa (Doidge 1948), and other *Phyllactinia* and *Ovulariopsis* spp. on legumes. The examination of all of this material revealed that the Mexican samples discussed above and several others discussed below represent new taxa. An *Ovulariopsis* Pat. & Har. anamorph on *Leucaena latisiliqua*, which has been found in Honduras and Mexico, proved to be a new species. The

new *Ovulariopsis* resembles the anamorph of a *Phyllactinia* on *Robinia* spp. in North America, which also proved to be an undescribed species. Furthermore, a collection of *Ovulariopsis* on *Erythrina abyssinica* from Zambia proved to be distinct from all anamorphs of *Phyllactinia* spp. on legumes. These new species have been compared with other *Phyllactinia* species described from the *Fabaceae*, and a key to *Phyllactinia* and *Ovulariopsis* species on hosts in this family has been prepared.

Materials and methods

The chasmothecia of the examined collections were described from material mounted in distilled water using oil immersion (bright field and phase contrast), but without any staining, using standard light microscopy (Olympus BX 50, Hamburg, Germany). Specimens of the anamorphs were put into a drop of lactic acid and gently heated. Conidia and other structures were measured (× 1000 magnification, n = 30 for each structure) with the extremes given in parentheses. The new Mexican collections are deposited at the herbarium of the Martin-Luther-University, Institute of Biology, Geobotany, Halle (Saale), Germany (HAL) and the herbarium of the Colegio de Postgraduados, Campus Montecillo, Orientación Fitopatología, Montecillo, Texcoco, Edo. de Méx., Mexico (CMPH). Other examined collections are from the following herbaria: BPI, IMI and PREM (abbreviations according to Holmgren et al. 1990).

Taxonomy

(1) ***Phyllactinia erythrinae*** Doidge, Bothalia 4: 841, 1948 FIG. 1

MATERIAL EXAMINED: SOUTH AFRICA. Greytown, on living leaves of *Erythrina caffra* Thunb. (*Fabaceae*), 16 Feb. 1929, E.M. Doidge (PREM 15418, **holotype**).

MYCELIUM internal and external, superficial mycelium hypophyllous, effuse, forming dense white patches or covers, persistent. HYPHAE straight to somewhat flexuous, branched, usually at right angles, 3–7 µm wide, hyaline, septate, thin-walled, smooth. APPRESSORIA not seen. CONIDIOPHORES arising from superficial hyphae, erect, straight to flexuous-sinuous throughout, up to 180 µm long, foot-cells straight to flexuous, up to 110 µm long and 5–9 µm wide, followed by 1–3 cells of variable length, but mostly shorter than the foot-cells, basal septum up to 10(–15) µm distant from the branching point with the supporting hypha. CONIDIA solitary, uniformly clavate, 60–100 × 15–25 µm, apex broadly rounded to somewhat attenuated. CHASMOTHECIA hypophyllous, scattered to gregarious, often immersed in the mycelial felt, 175–240 µm diam. PERIDIAL CELLS irregularly polygonal, 5–20 µm diam. PENICILLATE CELLS numerous, up to 80 µm long, stem subcylindrical to broadly ellipsoid-ovoid, 25–50 × 10–20 µm, apex with two to several distinct branchlets, short cylindrical

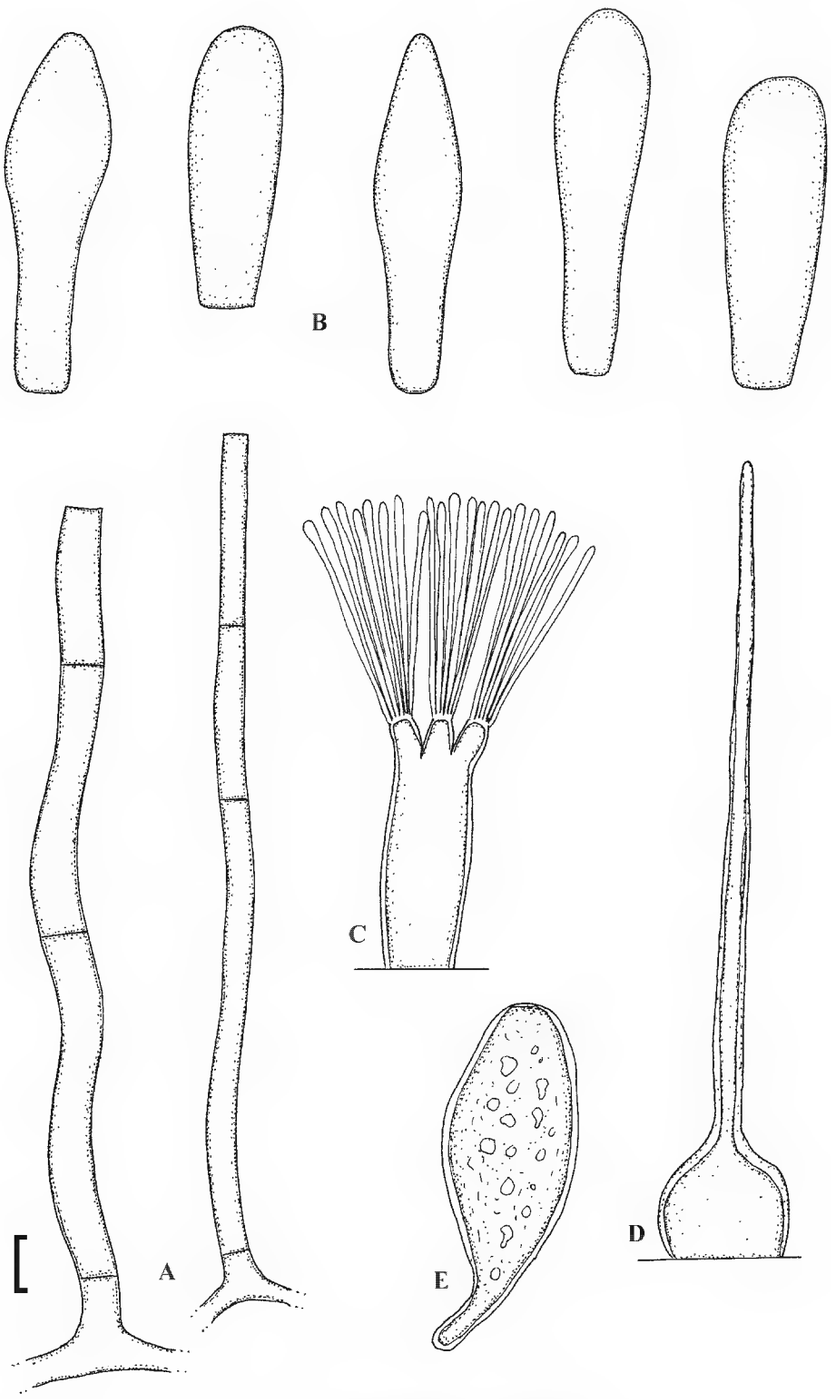

Fig. 1. *Phyllactinia erythrinae*.
A. Conidiophores. **B**. Conidia. **C**. Penicillate cell. **D**. Appendage. **E**. Ascus.
Scale bar = 10 µm [based on holotype material]. U. Braun *del*.

to somewhat conical, filaments about as long as the stem. Appendages more or less equatorial, 7–15, (1–)1.5–2 times as long as the chasmothecial diam. (up to 450 µm long), bulbose base 30–45(–50) µm diam., upper part acicular, apex obtuse to pointed, hyaline, wall thickened, up to 4 µm. Asci numerous, usually more than 15, narrowly saccate, stalked, 50–80 × 25–35 µm, always immature, ascospores not developed.

Comments: *Phyllactinia erythrinae* was described on *Erythrina caffra* from South Africa (Doidge 1948). Braun (1987) reduced this species to synonymy with *P. guttata* s. lat., which is, however, not tenable due to obvious differences between *P. guttata* s. str. (Shin & Lee 2002) and *P. erythrinae*. The penicillate cells of the chasmothecia of the South African species are characterized by having few, distinct, oblong, terminal branchlets, and the conidiophores are flexuous-sinuous. The stems of the penicillate cells in *P. guttata* s. str. have numerous [2–10(–16)], short, bulbous branchlets (Shin & Lee 2002), and the conidiophores are straight. The anamorph of *P. erythrinae* was not described in detail by Doidge (1948).

(2) ***Phyllactinia erythrinae-americanae*** Yáñez-Morales & U. Braun, **sp. nov.**

MycoBank MB 513302. Fig. 2

Phyllactiniae erythrinae *similis, sed hyphis valde flexuosis-sinuosis vel irregularibus, septo basali conidiophori 5–10 µm semoto a ramificatione mycelii, usque ad 10–35 µm, conidiis distincte dimorphis, conidiis primariis lanceolatis, 60–80 × 15–23 µm, conidiis secundariis clavatis, 50–90 × 18–26 µm, chasmotheciis parvioribus, (140–)150–200 µm diam., et appendicibus minoribus, 4–10.*

Type: MEXICO. Edo. de Mexico, Texcoco, on living leaves of *Erythrina americana* Mill. (*Fabaceae*), 2 Nov. 2008, Ma. de Jesús Yáñez-Morales (HAL 2316 F, **holotype**; isotype, CMPH).

Mycelium internal and external, superficial mycelium hypophyllous, forming thin white to grayish white patches or covers. Hyphae straight to usually strongly flexuous-sinuous to irregularly shaped, branched, 3–10 µm wide, septate, hyaline, smooth, thin-walled. Appressoria solitary, nipple-shaped, elongated, hooked to usually strongly lobed, almost coralloid, 4–15 µm diam. Conidiophores solitary per hyphal cell, erect, 50–170 µm long, foot-cells 30–130 × 6–9 µm, straight, cylindrical to flexuous-sinuous, basal septum always distant (10–35 µm) from the branching point with the supporting hypha, curved to sinuous part mostly confined to the portion below the basal septum, foot-cells followed by 1–2 shorter cells, 15–40 µm long. Conidia formed singly, dimorphic, primary conidia lanceolate, attenuated towards the tip, obtuse to pointed, base rounded to subtruncate, 60–80 × 15–23 µm, secondary conidia clavate, apex rounded, base subtruncate, 50–90 × 18–26 µm, germ tubes subapical or near the base, rarely lateral, flexuous, short to long, long germ tubes with septum. Chasmothecia scattered to subgregarious, (140–)150–200 µm diam. Peridial cells irregularly polygonal, 5–20 µm diam. Penicillate cells numerous, stem subcylindrical, 30–60 × (8–)10–15(–18) µm, apex with two to several distinct branchlets, sometimes deeply cleft, up to 25 µm, filaments about as long as the stem. Appendages more or less equatorial, 4–10, 1–2 times as long as the chasmothecial diam. (80–325 µm long), bulbose base 25–45 µm diam., upper part acicular, apex pointed, hyaline, wall thickened, up to 4 µm. Asci not developed.

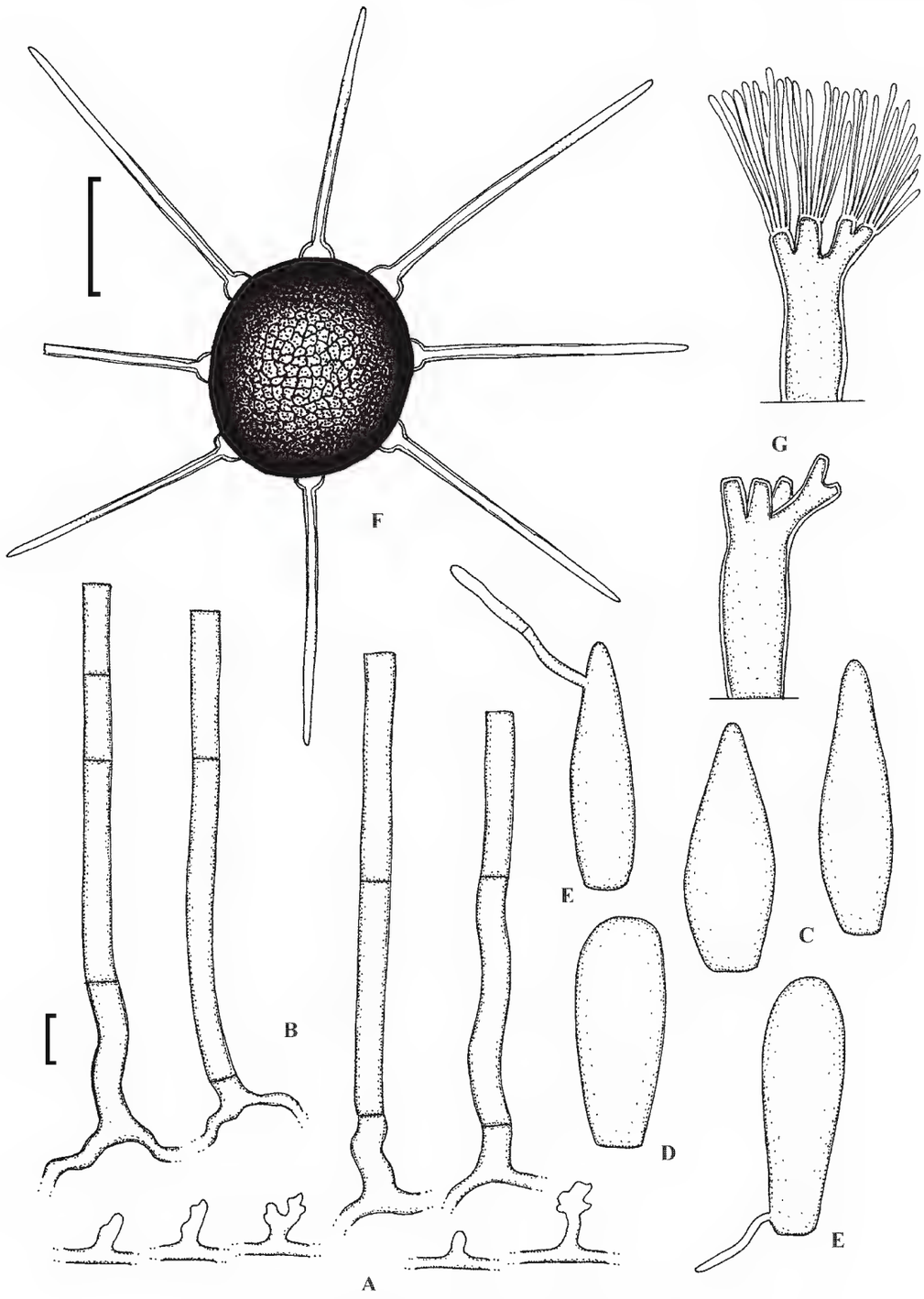

Fig. 2. *Phyllactinia erythrinae-americanae*.
A. Appressoria. **B**. Conidiophores. **C**. Primary conidia. **D**. Secondary conidium. **E**. Conidia with germ tubes. **F**. Chasmothecium. **G**. Penicillate cells. Scale bars = 10 µm (A–E, G), 100 µm (F) [based on holotype material]. U. Braun *del.*]

Additional material examined: MEXICO. Edo. de Mexico, Universidad Autónoma Chapingo, on living leaves of *Erythrina americana*, 8 Oct. 2008, J.M. López Pedraza (HAL 2314 F, CMPH, paratypes). MEXICO, Distrito Federal, Delegación Coyoacán, on living leaves of *Erythrina americana*, 15 Oct. 2008, J.M. López-Pedraza (HAL 2315 F, CMPH, paratypes).

Comments: Mexican material on *Erythrina americana* has been compared with type material of *Phyllactinia erythrinae*. The Mexican *Phyllactinia* on *Erythrina americana* is morphologically close to the South African *P. erythrinae*, but the latter species is easily distinguishable by having straight to only slightly flexuous hyphae, uniformly clavate conidia, 60–100 × 15–25 µm, and larger chasmothecia with (7–)9–15 appendages. Furthermore, the conidiophores are straight to flexuous-sinuous throughout, with a basal septum up to 10(–15) µm distant from the branching point with the supporting hypha. Mazzanti de Castañón & Cabrera de Alvarez (1985) described and illustrated *Phyllactinia* sp. on *Erythrina crista-galli* L. and *E. dominguezii* Hassl. from Argentina. Due to conidiophores with twisted foot-cells, dimorphic conidia (lanceolate and clavate) and penicillate cells with distinct terminal branchlets, these collections agree well with the Mexican material and seem to be close to or maybe identical with *P. erythrinae-americanae*. However, Mazzanti de Castañón & Cabrera de Alvarez (1985) described somewhat larger chasmothecia (up to 229 µm diam.) with 10–22 appendages. All collections on *Erythrina*, i.e. from Argentina, Mexico, and South Africa, are characterized by lacking or immature asci, which seems to be a characteristic, basic feature for this group of *Phyllactinia* species. The flexuous conidiophore foot-cells of *P. erythrinae-americanae* resemble those of *Phyllactinia dalbergiae* Piroz. (Braun 1987), but the latter species differs in having uniformly clavate conidia. Lanceolate conidia are also known in the South African *P. cassiae* G.J.M. Gorter & Eicker (Gorter & Eicker 1987), which is, however, easily distinguishable from *P. erythrinae-americanae* by having conidiophores with uniformly straight foot-cells and a basal septum only 5–10 µm distant from the branching point with the supporting hypha. Additionally, clavate conidia are lacking.

(3) ***Phyllactinia robiniae*** U. Braun & Yáñez-Morales, **sp. nov.** Fig. 3

MycoBank MB 513303.

Phyllactiniae erythrinae-americanae *similis, sed chasmotheciis majoribus, (180–)200–260 µm diam., et appendicibus brevioribus, 170–220 µm longis, septo primario conidiophori plus minusve basali, cellulis basalibus ubique sinuosis-subhelicoidibus.*

Type: USA. Arizona, Maricopa County, Wickenburg, Hossayampa Lake Road, on living leaves of *Robinia neomexicana* A. Gray (*Fabaceae*), 22 Aug. 1958, P.D. Keener (BPI 606711, **holotype**).

Mycelium internal and external, superficial mycelium hypophyllous, forming white patches or covers, persistent. Hyphae straight to usually strongly flexuous-sinuous, branched, 2–6 µm wide, hyaline, thin-walled, smooth. Appressoria solitary, nipple-shaped, oblong, straight to slightly curved, occasionally slightly lobed, 3–7 µm diam. or up to 10 µm long. Conidiophores arising from superficial hyphae, erect, 70–130 µm long, foot-cells up to 80 µm long, 2–7 µm wide, flexuous, sinuous-subhelicoid, first septum at the base or only up to

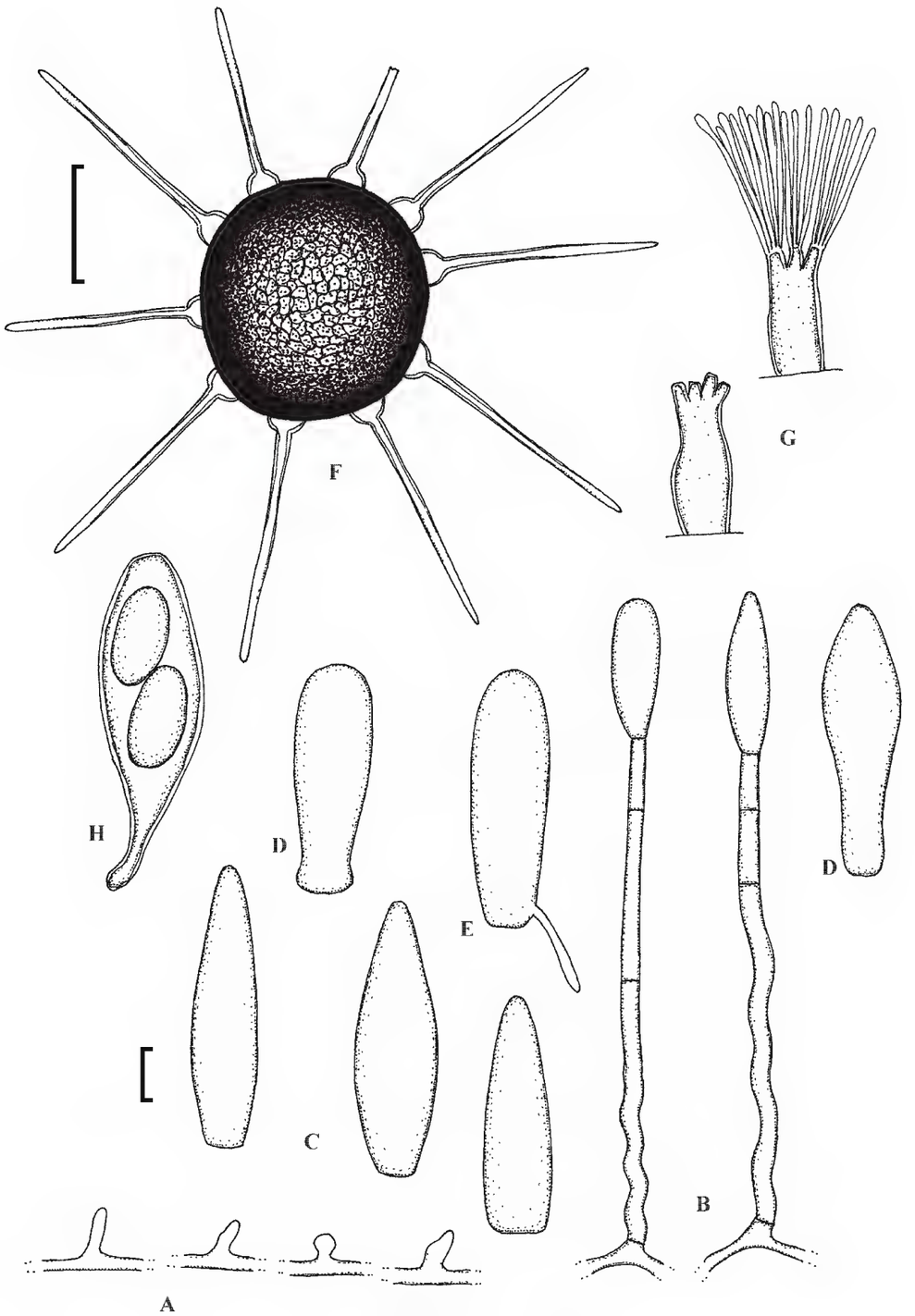

Fig. 3. *Phyllactinia robiniae.*
A. Appressoria. **B.** Conidiophores. **C.** Primary conidia. **D.** Secondary conidia. **E.** Conidium with germ tubes. **F.** Chasmothecium. **G.** Penicillate cells. **H.** Ascus. Scale bars = 10 μm (A–E, G–H), 100 μm (F) [based on holotype material]. U. Braun *del.*

5 μm distant from the branching point with the supporting hypha, foot-cells followed by 1–2 shorter cells, 10–40 μm long. Conidia solitary, primary conidia lanceolate, attenuated towards the tip, 40–55 × 12–18 μm, secondary conidia clavate, 40–70 × (10–)12–22 μm (on average wider than 15 μm), occasionally

somewhat enlarged at the very base, germ tubes subapical or subbasal, moderately long, simple or with a slightly lobed terminal appressorium. Chasmothecia hypophyllous, scattered to subgregarious, (180–)200–260 µm diam. Peridial cells irregularly polygonal, 10–25 µm diam. Penicillate cells terminal, numerous, up to 100 µm long, stem subcylindrical to ampulliform, 25–50 × 8–18 µm, with several short terminal branchlets, subcylindrical to bulbose, filaments 20–60 µm long. Appendages more or less equatorial, 10–18, short, 0.6–1.2 times as long as the chasmothecial diam. (170–220 µm), bulbose base 25–45 µm diam., upper part acicular, apex pointed, hyaline, wall thickened, up to 3 µm. Asci numerous, usually more than 20, clavate-saccate, 60–90 × 25–35(–40) µm, thin-walled (ca. 1 µm wide), 2-spored. Ascospores broadly ellipsoid-ovoid, hyaline, 20–35 × 10–23 µm.

Additional material examined: USA. Arizona, near Jerome, Mingus Mts., on living leaves of *Robinia neomexicana*, 13 Oct. 1917, L.N. Gooding (BPI 606716). Arizona, Prescott, on living leaves of *Robinia neomexicana*, 14 Sep. 1919, W.H. Long (BPI 60713, paratype). Arizona, Santa Catalina Mts., Mt. Lemmon, on living leaves of *Robinia neomexicana*, 13 Nov. 1948, W.G. & R. Solheim, Mycoflora Saximontanensis Exsiccata 416 (BPI 606710, paratype). Arizona, Yavapai County, Senator Mountain Highway, near Groom Creek, on living leaves of *Robinia neomexicana*, 22 Apr. 1958, P.D. Keener (BPI 606712, paratype). New Mexico, Santa Fe National Forest, Eureka Lodge, on living leaves of *Robinia neomexicana*, 26 Sep. 1937, W.H. Long (BPI 606714, paratype). New Mexico, Santa Fe, 28 Aug. 1938, W.H. Long (BPI 606715). New Mexico, State College, on living leaves of *Robinia pseudoacacia* L. (*Fabaceae*), Oct. 1936, I.H. Crowell (BPI 607138, paratype).

Comments: This new *Phyllactinia* on *Robinia* spp. resembles *P. erythrinae-americanae*. However, the basal septum of the conidiophores in the latter species is 10–35 µm distant from the branching point with the supporting hypha, and the sinuous part is usually confined to the portion below the basal septum. Furthermore, the chasmothecia in *P. erythrinae-americanae* are much smaller, (140–)150–200 µm diam., and have less appendages (4–10). In *P. dalbergiae*, another species with twisted foot-cells of the conidiophores, the conidia are uniformly clavate, i.e. lanceolate conidia are lacking (Braun 1987).

(4) ***Ovulariopsis erythrinae-abyssinicae*** U. Braun & Yáñez-Morales, **sp. nov.**

MycoBank MB 513304. Fig. 4

Mycelium internum et externum, mycelium externum hypophyllum, gracile, albidum, evanescens, hyphis ramosis, septatis, hyalinis, tenuitunicatis, laevibus, 2–6 µm latis. Appressoria ignota. Conidiophora solitaria, ex hyphis superficialibus oriunda, erecta, recta, subcylindrica, usque ad 220 µm longa, recta, septo basali 5–10 µm semoto a ramificatione mycelii, cellulis basalibus usque ad 90 µm longis et 6–9 µm latis, rectis, interdum basi leniter curvata vel flexuosa, cellulis sequentibus 1–2, 15–50 µm longis. Conidia solitaria, late clavata-obovoidea, (35–)40–60 × 18–28 µm.

Type: ZAMBIA. 9 miles west of Lusaka, on living leaves of *Erythrina abyssinica* Lam. ex DC. [= *E. tomentosa* R. Br. ex A. Rich.] (*Fabaceae*), 6 Apr. 1962, A. Angus (IMI 95369a, **holotype**).

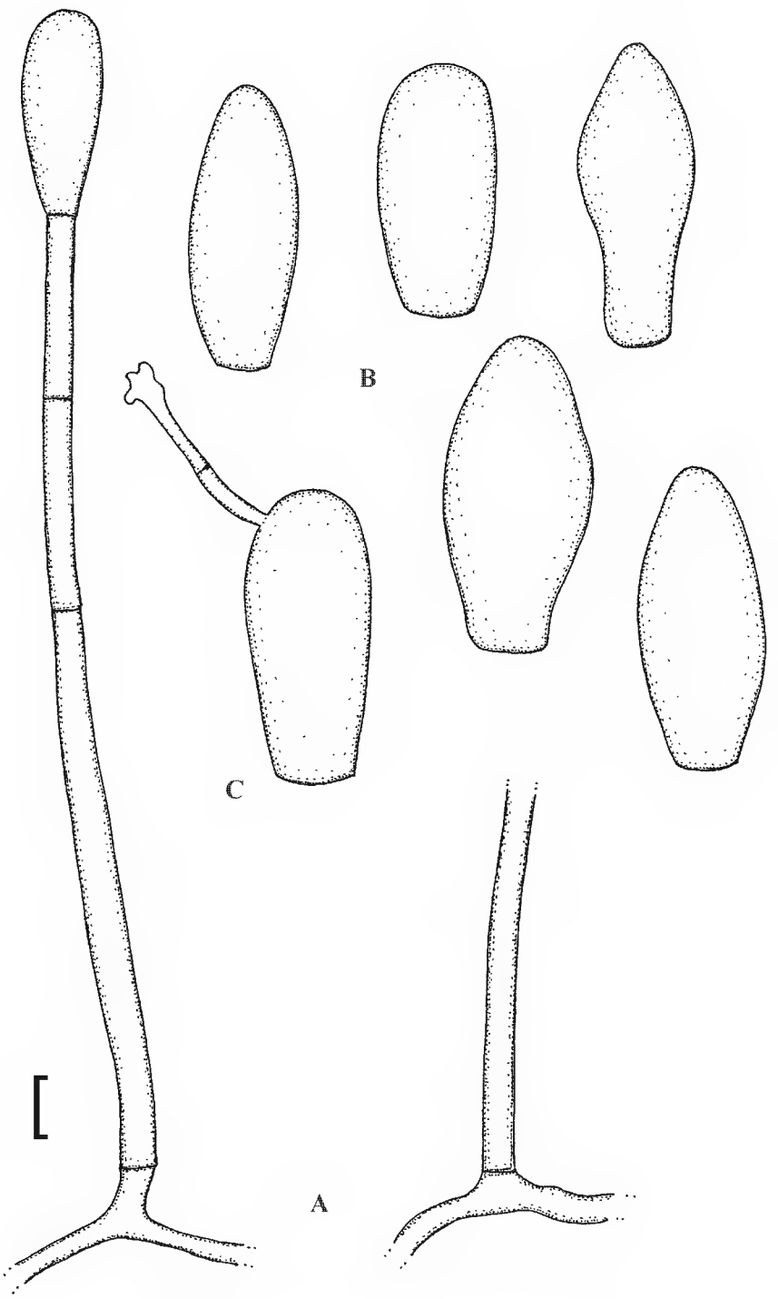

Fig. 4. *Ovulariopsis erythrinae-abyssinicae*.
A. Conidiophores. **B**. Conidia. **C**. Conidium with germ tubes.
Scale bar = 10 µm [based on holotype material]. U. Braun *del*.

Mycelium internal and external, external mycelium hypophyllous, thin, evanescent. Hyphae branched, septate, hyaline, thin-walled, smooth, 2–6 µm wide. Appressoria not seen. Conidiophores arising from superficial hyphae, erect, straight, cylindrical, up to 220 µm long, basal septum 5–10 µm distant from the branching point with the supporting hypha, foot-cells up to 90 µm long, 6–9 µm wide, straight, occasionally slightly curved to flexuous at the very base, followed by 1–2 shorter cells, 15–50 µm long. Conidia formed singly, broadly clavate-obovoid, (35–)40–60 × 18–28 µm.

Comments: This *Ovulariopsis* on *Erythrina abyssinica* from Africa is easily distinguishable from the anamorph of *P. erythrinae* by its much shorter, broadly clavate-obovoid conidia (conidia oblong clavate, 60–90(–100) × 15–25 µm in *P. erythrinae*) and straight conidiophores. The anamorph of *Phyllactinia erythrinae-americanae* differs in having distinctly dimorphic conidia and conidiophores with a basal septum up to 35 µm distant from the branching point with the supporting hypha. Furthermore, the foot-cells of the conidiophores are often flexuous-sinuous, especially at the base below the septum.

(5) ***Ovulariopsis leucaenae*** López-Pedraza, Yáñez-Morales & U. Braun, **sp. nov.**
MycoBank MB 513305. Fig. 5

Oidio Phyllactiniae robiniae *valde simile, sed conidiis angustioribus, conidiis primariis 40–60 × 8–13 µm, conidiis secundariis 40–65 × 10–15 µm.*

Type: MEXICO. Guerrero, Alpoyeca, Municipality of Huamuxtitlan, on living leaves of *Leucaena latisiliqua* (L.) Gillis [= *L. leucocephala* (Lam.) de Wit] (*Fabaceae*), 10 Jan. 2009, J.M. López-Pedraza (HAL 2318 F, **holotype**; isotype, CMPH).

Mycelium internal and external, amphigenous, forming thin, white or grayish white epiphyllous covers and small hypophyllous patches. Hyphae usually flexuous, irregular, geniculate-sinuous, subtorulose, branched, 3–8 µm wide, hyaline, thin-walled, smooth. Appressoria solitary, rarely in opposite pairs, nipple-shaped, oblong, hooked to distinctly lobed, 3–8 µm diam. Conidiophores arising from superficial hyphae, solitary, position between two hyphal septa usually non-central, erect, 40–180 × 2–7.5 µm, basal septum mostly somewhat distant from the branching point with the supporting hypha, ca. 5 µm, foot-cells 25–110 × 2–6 µm, flexuous-sinuous, subhelicoid, usually followed by 1–2(–3) shorter cells, 15–40 µm long, occasionally second cell relatively long, conidiogenous cell sometimes distinctly bent before the conidial secession. Conidia solitary, dimorphic, primary conidia narrowly ellipsoid-obovoid to distinctly lanceolate, rarely subcylindrical, apex rounded to somewhat pointed, base subtruncate, 40–60 × 8–13 µm, secondary conidia distinctly clavate, 50–70 × 10–15 µm, apex broadly rounded, base subtruncate, germ tubes subbasal, filiform, short to moderately long, straight to sinuous.

Additional material examined: HONDURAS. Taulabe, on living leaves of *Leucaena latisiliqua*, 2 Feb. 1993, E. Boa & J. Lenne (IMI 35936, paratype).

Comments: *O. leucaenae* is morphologically close to *Phyllactinia robiniae*, but it differs in having much narrower conidia, on average narrower than 15 µm. Furthermore, the conidiophores of *O. leucaenae* with flexuous-sinuous to subhelicoid foot-cells resemble those of *Phyllactinia dalbergiae*, but the latter species is easily distinguishable from the *Ovulariopsis* on *Leucaena* by having broader, uniformly clavate conidia, (10–)13–24 µm wide (Braun 1987, Bappammal 1995, Paul & Thakur 2006). The conidiophores of *P. erythrinae-*

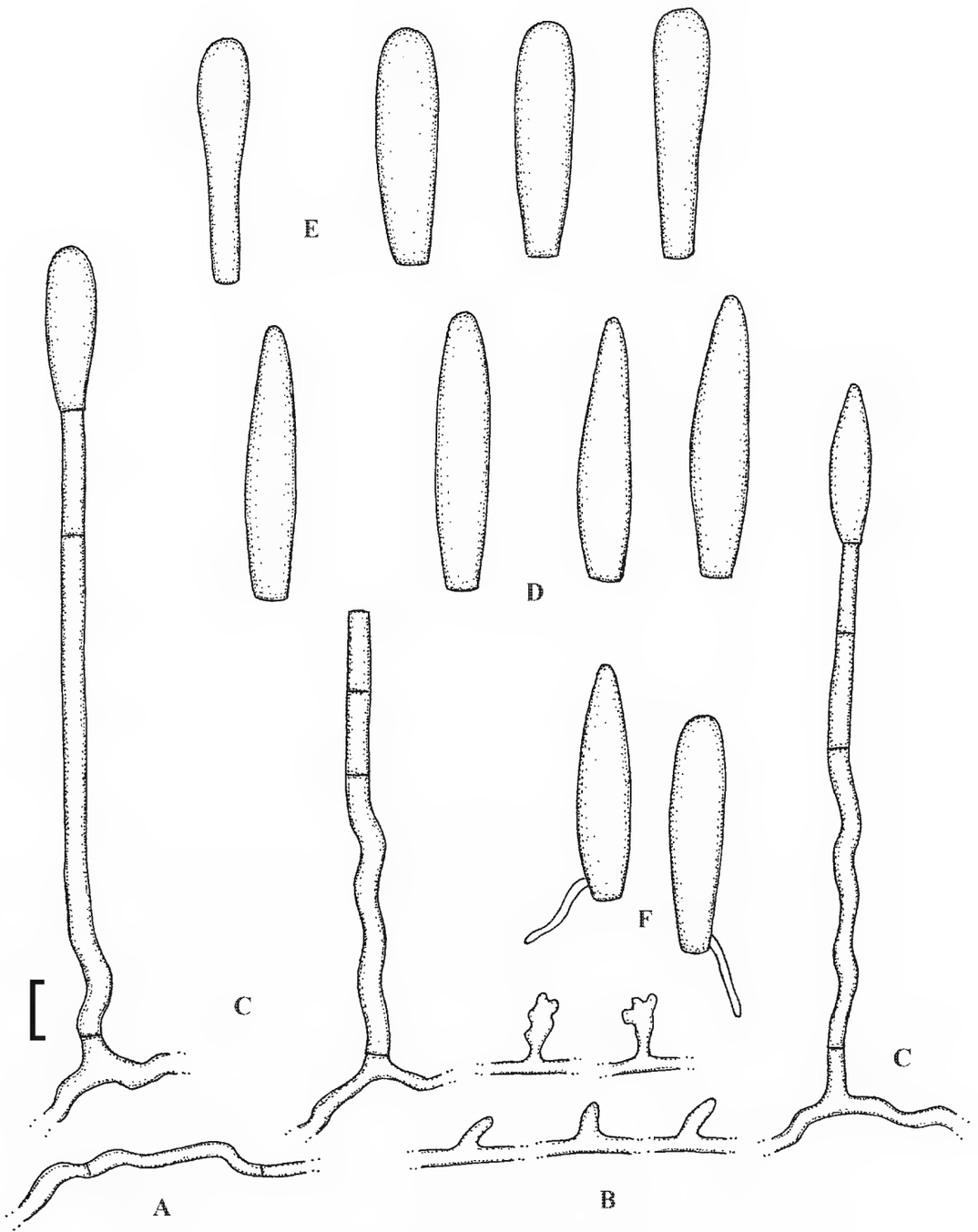

Fig. 5. *Ovulariopsis leucaenae*.
A. Hypha. **B**. Appressoria. **C**. Conidiophores.
D. Primary conidia. **E**. Secondary conidia. **F**. Conidia with germ tubes.
Scale bar = 10 µm [based on holotype material]. U. Braun *del.*

americanae are also similar, but broader, 6–9 µm wide, and mostly only flexuous-sinuous below the basal septum, which is up to 35 µm distant from the branching point with the supporting hypha. Additionally, the conidia of the latter species are much wider, 15–23 µm. *P. cassiae* is another *Phyllactinia* species on a legume with lanceolate conidia, but clavate conidia are lacking.

Also, the foot-cells of the conidiophores are straight, and the conidia are wider, (12.5–)15–17.5(–20) µm.

Key to *Phyllactinia* and *Ovulariopsis* spp. on legumes

Several other species of *Phyllactinia* and *Ovulariopsis* have been described from hosts belonging to the *Fabaceae*: *Ovulariopsis ellipsospora* G.J.M. Gorter (Gorter 1989), *Phyllactinia acaciae* Syd. (Sydow 1935, Doidge 1948, Patil 1962) [holotype material examined (PREM 23428)], *P. adesmiae* Havryl. (Havrylenko 1995, 1997) [type material examined (HAL 1664 F)], *P. bauhiniae* Y.S. Paul (Paul & Thakur 2006, Braun & Paul 2009), *P. caesalpiniae* Y.N. Yu (Yu et al. 1979, Chen et al. 1987), *P. cassiae* (Gorter & Eicker 1987), *P. cassiae-fistulae* U. Braun & Y.S. Paul (Braun & Paul 2009), *P. dalbergiae* (Patil 1962, Pirozynski 1965, Braun 1987, Bappammal et al. 1995), *P. desmodii* J.F. Tao et al. (Tao et al. 1980), *P. erythrinae* (Doidge 1948), *P. evansii* Doidge (Doidge 1948) [holotype material examined (PREM 9758)], *P. phaseolina* N. Ahmad et al. (Ahmad et al. 1987), *P. sphenostylidis* Doidge (Doidge 1948) [holotype material examined (PREM 17024)], *P. verruculosa* D.Z. Xie (Xie 1992).

Phyllactinia suffulta f. *glycines* Jacz. (Jaczewski 1927) was introduced for a *Phyllactinia* on *Wisteria sinensis* (*Fabaceae*) recorded from Western Europe. A collection on this host has also been found in Germany (Sachsen-Anhalt, Halle, Botanical Garden of the Martin-Luther-University, 28 Oct. 1999, U. Braun, HAL 610 F). Takamatsu et al. (2008) included the *Phyllactinia* on *Wisteria sinensis* in molecular sequence analyses. Sequences of the latter fungus agreed with those of European collections of *Phyllactinia fraxini* (DC.) Fuss on *Fraxinus excelsior* (*Oleaceae*). The German collection on *W. sinensis* is characterized by having straight, filiform conidiophores, up to 100 × 5–7 µm, and uniformly clavate conidia, 50–70 × 12–20 µm. The chasmothecia are relatively large, 190–250 µm diam., with 6–15 appendages, 1–1.5 times as long as the chasmothecial diam., penicillate cells 60–90(–100) µm long, stem subcylindrical to more or less ampulliform, 20–50 µm long, 10–25 µm wide, upper part narrower, 8–15 µm, apex with several short to moderately long branchlets, up to 10 µm long, filaments about as long as the stem, 30–50 µm, asci numerous, saccate, stalked, 50–90 × 25–35 µm, immature, a few 2-spored, ascospores 18–25 × 12–15 µm. Collections of *P. fraxini* found on *Syringa vulgaris* (*Oleaceae*) in the Botanical Garden Halle (HAL 609 F) and on planted trees of *Fraxinus excelsior* in the close neighborhood of the Botanical Garden Halle (U. Braun, Fungi selecti exsiccati 78, HAL) have been examined and compared with the *Phyllactinia* on *Wisteria sinensis*. Besides the genetic conformity, collections on *Fraxinus*, *Syringa* and *Wisteria* also coincide morphologically. This indicates that host switches within *Phyllactinia* have to be taken into consideration.

1 Chasmothecia and anamorph present or only anamorph present 2
1* Only chasmothecia present, anamorph lacking or unknown 15
2 Conidia uniform, clavate or broadly clavate-obovoid 3
2* Conidia either uniform, but not clavate, or distinctly dimorphic 7
3 Conidia broadly clavate-obovoid, 35–60 × 18–28 µm; conidiophores straight; on *Erythrina abyssinica*, Zambia ..... *Ovulariopsis erythrinae-abyssinicae*
3* Conidia uniformly clavate, usually longer and slender 4
4 Foot-cells of the conidiophores sinuous–twisted at the base; on *Dalbergia* spp., Asia (India) ..... *P. dalbergiae*
4* Foot-cells of the conidiophores straight or straight to flexuous throughout 5
5 Appendages less than 10 per chasmothecium, about as long as the chasmothecial diam.; on *Sphenostylis angustifolia*, South Africa ..... *P. sphenostylidis*
5* Appendages up to 15 per chasmothecium, 1–2 times as long as the chasmothecial diam.; on other hosts 6
6 Asci always immature; conidiophores straight to flexuous throughout; on *Erythrina caffra*, South Africa ..... *P. erythrinae*
6* Asci usually developed and mature, with 2–3 ascospores; conidiophores straight; on *Fraxinus* spp. and other hosts of the *Oleaceae*, in Europe occasionally on *Wisteria sinensis* ..... *P. fraxini*
7(2) Conidia uniformly ellipsoid-cylindrical, oblong, sometimes with somewhat swollen ends 8
7* Conidia not ellipsoid-cylindrical or conidia distinctly dimorphic 12
8 Conidia often somewhat enlarged at the base, cingulum-like; on *Adesmia campestris*, South America (Argentina) ..... *P. adesmiae*
8* Conidia without cingulum-like structures 9
9 Conidia subcylindrical, but often somewhat concave in the middle, 10–15 µm wide at the ends and 6–9 µm wide in the middle; on *Acacia* spp., Asia, South Africa ..... *P. acaciae*
9* Conidia ellipsoid-cylindrical, not concave in the middle (or with some old conidia becoming narrower in the middle and wider at the ends, but then cylindrical conidia wider, up to 18 µm) 10
10 Conidia ellipsoid to narrowly ellipsoid-oblong, occasionally navicular (almost clavate, but apex attenuated, pointed), 40–80 × 17.5–27.5 µm; on *Cajanus cajan*, South Africa ..... *Ovulariopsis ellipsospora*
10* Conidia ellipsoid-cylindrical, but not navicular, smaller, above all narrower, ca. 40–60 × 10–20 µm 11
11 Chasmothecia small, 150–180 µm diam., with 8–12 appendages; conidia ellipsoid-cylindrical, 40–50 × 10–20 µm; on *Cassia fistula*, Asia (India) ..... *P. cassiae-fistulae*
11* Chasmothecia larger, 180–230 µm diam., with 10–15 appendages; conidia subcylindrical, oblong, occasionally width slightly increasing towards the apex (subclavate), 40–60 × 10–18 µm, some older conidia narrower in the middle, 7–9 µm, and wider at the ends; on *Burkea africana*, South Africa ..... *P. evansii*

12(7) Conidiophores with straight foot-cells; conidia ventricose-lanceolate, tapering towards a pointed apex, finally becoming lageniform, with obtuse apex; on *Cassia abbreviata*, South Africa ..... *P. cassiae*

12* Conidiophores at least partly flexuous-sinuous; conidia distinctly dimorphic, lanceolate and clavate 13

13 Foot-cells of the conidiophores straight to flexuous-sinuous at the base, basal septum 10–35 µm distant from the branching point with the supporting hypha, flexuous-sinuous portion usually confined to the part below the basal septum; conidia 50–90 × 15–26 µm; on *Erythrina americana*, Mexico ..... *P. erythrinae-americanae*

13* Foot-cells of the conidiophores flexuous-sinuous to subhelicoid throughout, first septum of the conidiophores basal or only 5–10 µm distant from the branching point with the supporting hypha; conidia somewhat shorter 14

14 Conidia very narrow, 40–70 × 8–15 µm; on *Leucaena latisiliqua*, North America (Mexico, Honduras) ..... *Ovulariopsis leucaenae*

14* Conidia on average wider than 15 µm; on *Robinia* spp., North America ..... *P. robiniae*

15(1) Chasmothecia large, 200–330 µm diam., appendages 5–16, long, (1–)1.5–2(–2.5) times as long as the chasmothecial diam.; on *Desmodium sinuatum*, China ..... *Phyllactinia desmodii*

15* Chasmothecia smaller, diameter ≤ 250 µm, appendages mostly shorter 16

16 Chasmothecia small, 150–190 µm diam., average < 180 µm, appendages about as long as the chasmothecial diam.; on *Cassia* spp. 17

16* Chasmothecia larger, average > 180 µm, or appendages longer; on other hosts ... 18

17 On *Cassia abbreviata*, South Africa ..... *P. cassiae*

17* On *Cassia fistula*, India (distinct from *P. cassiae* in the anamorph) *P. cassiae-fistulae*

18 Asci always lacking, not developed or immature, even in mature chasmothecia, appendages 1–2 times as long as the chasmothecial diam.; on *Erythrina* spp. 19

18* Asci developed in mature chasmothecia or appendages shorter 20

19 Chasmothecia 180–240 µm diam., with 9–15 appendages; South Africa ..... *P. erythrinae*

19* Chasmothecia (140–)150–200 µm diam., with 4–10 appendages; Mexico ..... *P. erythrinae-americanae*

20 Appendages occasionally nodulose, surface irregular, coarsely verrucose, tips rounded, rarely uncinate; on *Indigofera scabrida*, China ..... *P. verruculosa*

20* Appendages non-nodulose, smooth 21

21 Appendages about as long as the chasmothecial diam. or usually shorter 22

21* Appendages 1–1.5(–2) times as long as the chasmothecial diam. 24

22 Asci 2–3-spored; on *Acacia* spp., Asia (India), South Africa ..... *P. acaciae*

22* Asci 2-spored; on other hosts 23

23* Appendages 6–8; on *Bauhinia* sp., India ..... *P. bauhiniae*
23* Appendages 10–18; on *Robinia* spp., North America ..... *P. robiniae*
24(21) Ascospores very large, 43–64 × 16–22 µm; on *Adesmia campestris*, Argentina ..... *P. adesmiae*
24* Ascospores smaller, length below 40 µm 25
25 Appendages 1–1.5(–2) times as long as the chasmothecial diam. 26
25* Appendages about as long as the chasmothecial diam or shorter 27
26 Chasmothecia 190–250 µm diam., average > 200 µm, penicillate cells mostly ampulliform, wider at the base and narrower upwards, apically distinctly branched; occasionally on *Wisteria sinensis*, Europe ..... *P. fraxini*
26* Chasmothecia smaller, 165–230 µm diam., average < 200 µm, penicillate cells narrowly cylindrical, not distinctly branched; on *Caesalpinia japonica*, *C. sepiaria* and *Gleditsia sinensis* (= *G. macracantha*), Asia ..... *P. caesalpiniae*
27 Appendages few, 4–10 28
27* Appendages numerous, 6–20, usually more than 10 29
28 On *Sphenostylis angustifolia*, South Africa ..... *P. sphenostylidis*
28* On *Phaseolus trilobus*, India ..... *P. phaseolina*
29 Asci very numerous, up to 40, 2–3-spored; on *Burkea africana*, South Africa ..... *P. evansii*
29* Asci less numerous, usually 4–15, 2-spored; on *Dalbergia* spp., Asia ..... *P. dalbergiae*

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